

# Electronics Simulation Update

LArSoft Meeting  
Dec. 21, 2011

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# Summary

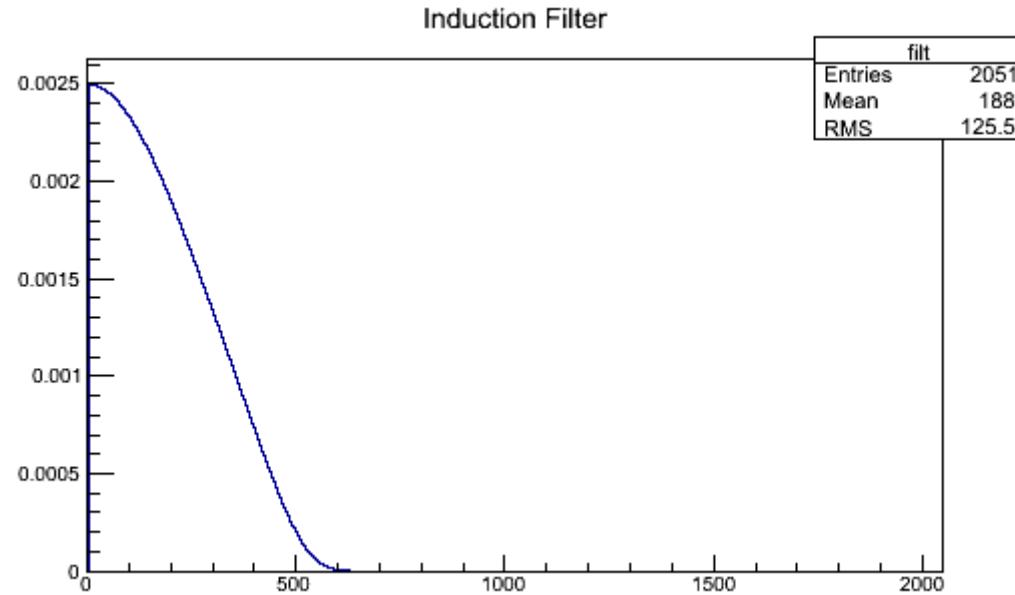
- SignalShapingServiceMicroBooNE (which calculates MicroBooNE response function and deconvolution kernel on the fly) is committed in Utilities svn package.
- CalWire module has been modified to get deconvolution kernel from SignalShapingServiceMicroBooNE instead of reading old precalculated kernel from data file.
  - Works with  $t_s = 500$  ns (tested using MicroBooNE reconstruction chain).
  - Needed a few tweaks to the filter function to get hit-finding to work.
  - Updates are committed in CalData and Utilities svn packages.

# Filter Function Updates

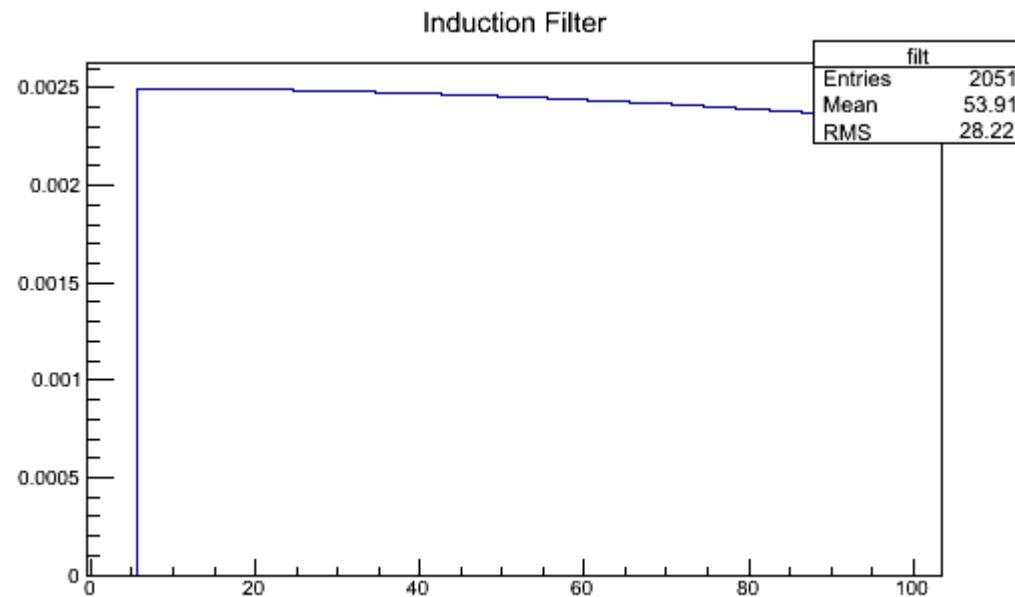
- Adjusted filter function normalization to produce deconvoluted signals with a reasonable size.
  - Just eyeball normalization currently. Not sure how to optimize or calibrate signal normalization.
- Filter function parameterization changed to physical units (MHz) instead of dimensionless (cycles/tick), so that filter function width depends reasonably on sampling rate.
- Added low frequency filter cutoff in induction view.

# Updated Induction Filter (Low Freq. Cutoff)

Full scale



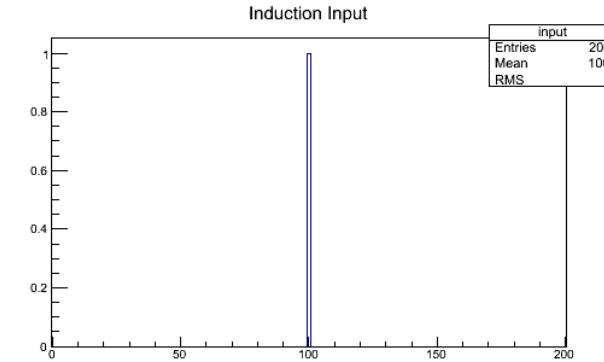
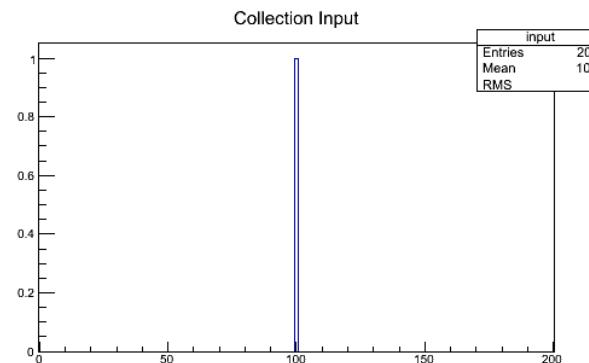
Zoomed



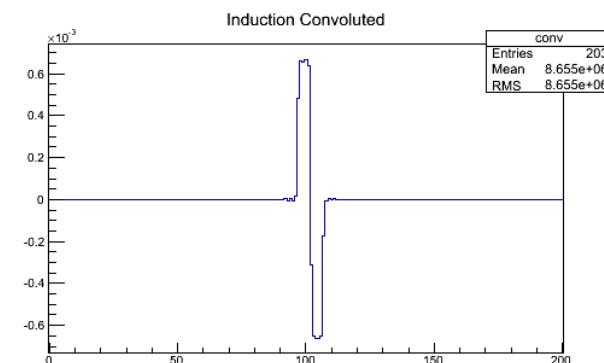
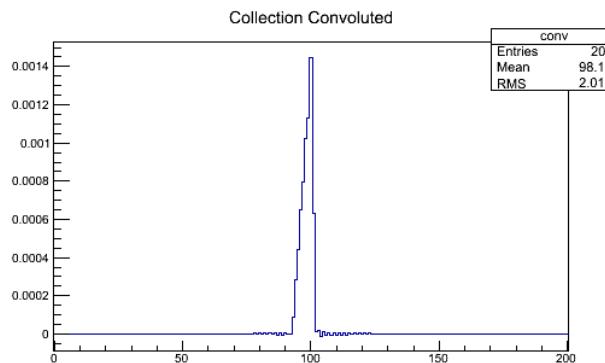
# Updated Idealized MicroBooNE Performance

$t_s = 500 \text{ ns}$

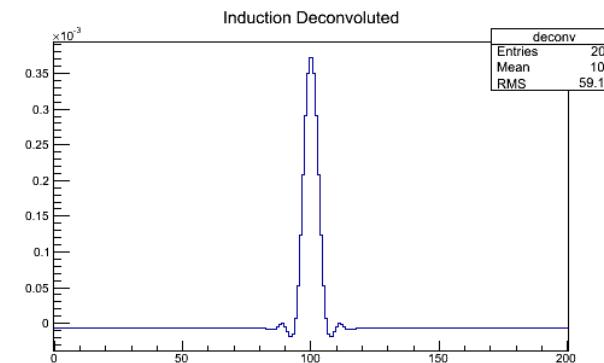
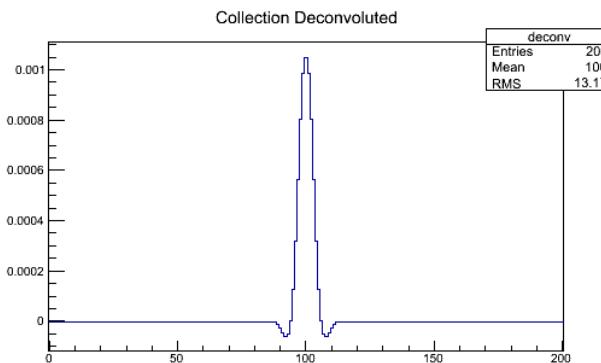
Input



Convolved

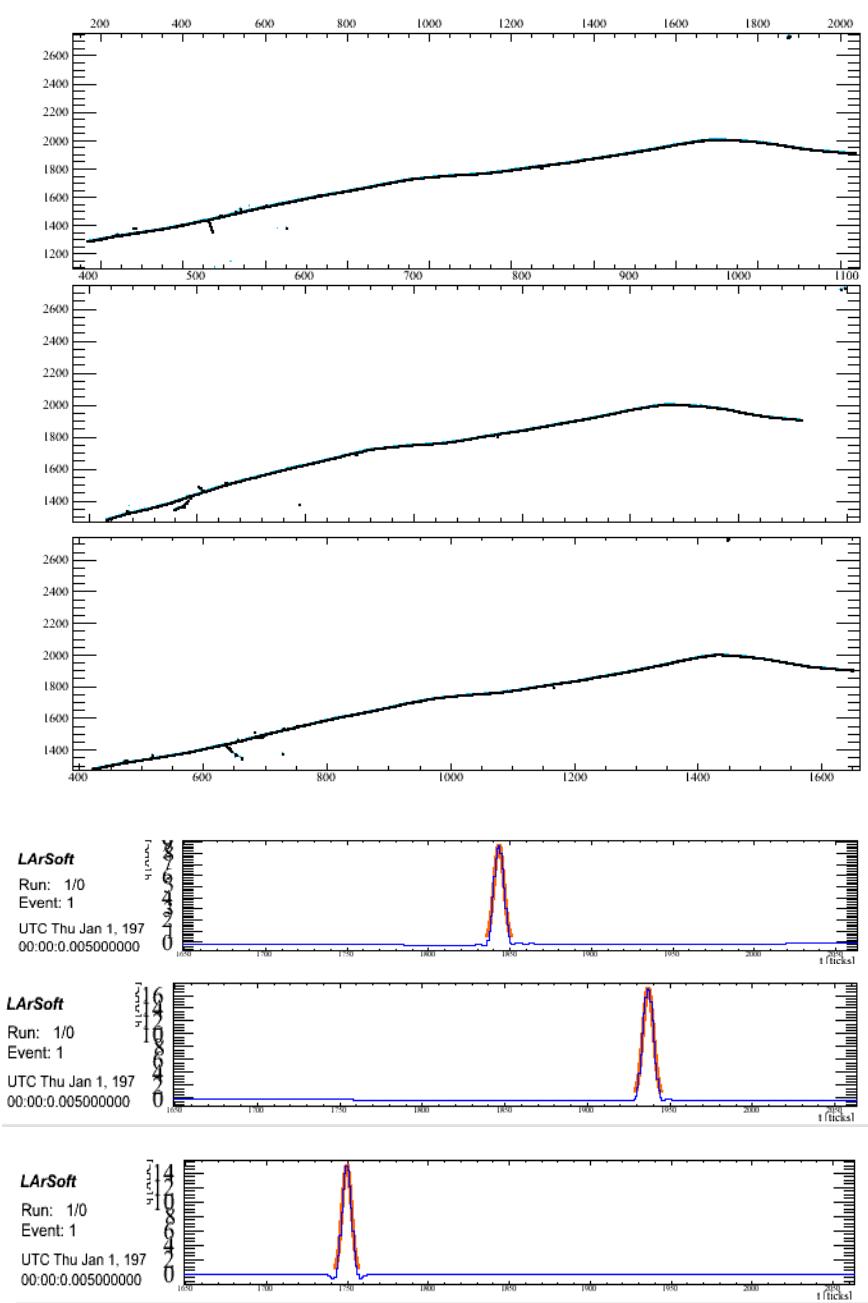


Deconvoluted



# A Reconstructed MicroBooNE Event

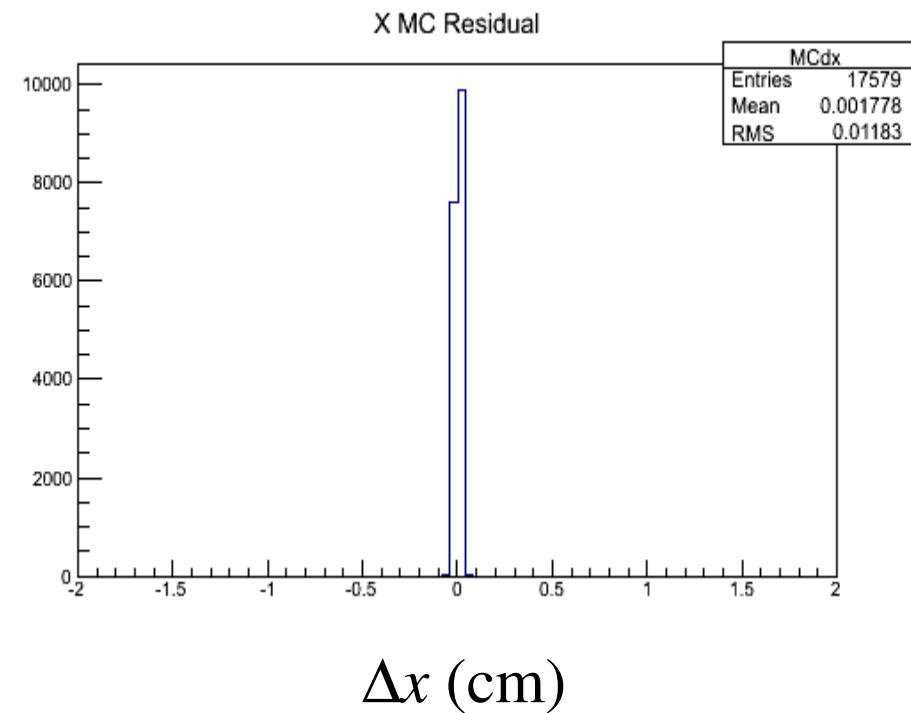
$t_s = 500 \text{ ns}$



# Space Point Reconstruction

- Tuned space point time offsets using new deconvolution kernel.
  - Planes are now in time relative to each other.
  - Still an unexplained absolute time offset of < 1 tick.

```
microboone_spacepointservice:  
{  
    UseMC: false  
    MaxDT: 2.0  
    MaxS: 0.3  
    TimeOffsetU: 0.75  
    TimeOffsetV: 0.75  
    TimeOffsetW: 0.75  
    MinViews: 3  
    EnableU: true  
    EnableV: true  
    EnableW: true  
    Filter: true  
}
```



# Tasks

- Modify SimWire to get convolution kernel from SignalShapingServiceMicroBooNE.
  - It's the same as the one it is currently using.
- Tune / optimize filter function.
- Recalculate field response.
- Understand how to tune the absolute signal normalization of deconvoluted signals.